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ABSTRACT

An analysis of the syntax of economics textbooks was undertaken to (1) provide real-language examples of the difficult grammatical structures being taught in an advanced economics reading course, and (2) construct a factual database of the nature of economics textbooks. Five texts representative of those typically used in introductory economics courses were selected and ten sample excerpts (approximately 250-600 words each) from each textbook were analyzed for the presence of the following complex grammatical structures: infinitives, relative clauses, fronting, clefting, pseudo-clefting, passives, appositives, that-clauses, wh-noun clauses, present and past participial phrases, gerund phrases, complex adjective structures, parallel structures, and compression or ellipsis. The findings are presented with implications and suggestions for classroom teaching. Additional research on finance and statistics textbooks is planned for comparison. (Author/MSE)

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SYNTACTICAL ANALYSIS OF ECONOMICS TEXTBOOKS

George K. Wilcox

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ABSTRACT

This analysis was undertaken for two reasons: (1) to provide real-language examples of certain complex grammatical structures being taught in an advanced reading course and (2) to construct a factual database, however small, of the nature of the English of economics.

Five textbooks representative of those typically used in introductory economics courses were selected and ten sample excerpts (each ranging from approximately 250 to 600 words in length) from each textbook were analyzed for the presence of the following complex grammatical structures: (a) infinitives, (b) relative clauses, (c) fronting, (d) clefting, (e) pseudoclefting, (f) passives, (g) appositives, (h) that-clauses, (i) Wh-noun clauses, (j) present and past participial phrases, (k) gerund phrases, (l) complex adjective structures, (m) parallel structures and (n) compression (or ellipsis).

Findings from the analysis are presented along with implications and suggestions for classroom teaching. Future analyses will look at complex grammatical structures found in representative textbooks in (a) finance and in (b) statistics (for economics and business) and compare results with those above.

Syntactical Analysis of Economics Textbooks

For a recent class at the Economics Institute, where I work, students were given the script of a lecture to read before the lecture was actually given. The script contained complex sentences such as the following:

"Micro data, which more richly describe the individual agents making fertility and human capital investment decisions and the environment in which they take place, may appear to provide a superior basis for inferring the causal mechanisms that form the core of models of economic growth and that potentially underlie the observed aggregative associations between economic development, fertility and human capital levels." (Rosenzweig 2)

"For example, when agents are mobile, wages are influenced by human capital investments, and such investments are made according to some (optimal) decision rules, the cross-sectional association between wage rates, family size and schooling would reveal little about the determinants of fertility or of its effects on human capital investments, particularly when the major source of cross-sectional heterogeneity is in preference orderings." (Rosenzweig 2)

"In this paper I review and present findings from empirical analyses that have attempted to estimate both the determinants and consequnces of fertility and human capital investments based on the exploitation of 'natural' experiments in micro data that plausibly simulate the theoretically-appropriate experiments designed to infer causal relations." (Rosenzweig 2)

"To more rigorously establish the relationships among the costs and returns to schooling, fertility and school investments and to assess whether economic models of fertility behavior yield refutable predictions with respect to changes in schooling returns, I formulate a simple model of family size and schooling decisions designed to incorporate the major features of fertility models developed over the last 15 years." (Rosenzweig 5)

"Thus, the empirical associations between child wage rates, schooling and fertility can be used to test the proposition that

economic theories of fertility are capable of explaining why certain changes in the economic environment can result in opposite trends in fertility and human capital levels." (Rosenzweig 8)

"The figures in Table 3 thus indicate, consistent with the pattern of child wage elasticity estimates in Table 3, that increases in the pace of development, fueled by exogenous technical change, can lead to substantial reductions in fertility and increases in human capital investment without direct family planning interventions." (Rosenzweig 17)

"The principal difficulty with exploiting the cross-area variability in either program presence or intensity to estimate the effects of programs on the behavior of households is that the areal distribution of programs is unlikely to correspond to the randomized distribution required for the appropriate experiment." (Rosenzweig 28)

When foreign students (or even native speakers of English, for that matter) encounter sentences such as the above in their reading, they very often have difficulty deciphering the meaning. When I was a student learning German twenty-five years ago, I often had the same problem: I could understand all the words, but because of the complexity of the grammar, I could not get at the exact meaning of a particular text.

With such reading problems in mind, we at the Economics Institute have designed a short course which focuses on reading complex sentences. In this course we concentrate on the following grammatical structures:

Structure	Examples
(1) Passive Voice	"The work had been achieved through sheer determination."
(2) Relative Clauses	"Their determination, which we understood, led to problems."
(3) Participial Phrases	"The problems alluded to by the judge had been solved." (past part. phrase) "Our boss, needing a quick reply, called us all in." (present part. phrase)

(4) Appositives	"Our old dictionaries, the best reference works in town, were nearing the end of their useful lives."
(5) That-Clauses	"That we needed to depart on time was clear enough." (as subject) "She indicated (that) all was not well." (as object) "It was decided (that) we'd stay." (as delayed subject)
(6) Wh-Noun Clauses	"When they should come will be determined next week." (as subject) "The leading economists have suggested how we might respond." (as object)
(7) Fronting	"The gold jewelry I liked; the black I didn't."
(8) Clefting	"It was the gold jewelry that I liked."
(9) Pseudoclefting	"What I liked was the gold jewelry."
(10) Gerund Phrases	"Increasing the price of oil only exacerbated the problem." (as subject) "They discussed the problem of helping the needy." (as object of a preposition)
(11) Infinitive Phrases	"To run with a friend will make your life more enjoyable." (as subject) "To run with a friend you will need special shoes." (in order to)
(12) Complex Adjective Phrases	"The university basketball team summer picnic planning meeting was cancelled." (multiple nouns modifying a noun head) "The table -- short, narrow and well-built but lacking a fourth leg -- had been brought in the previous weekend." (appositive-like) "Computer-aided instruction is helpful." (hyphenated)
(13) Parallelism	"We were reminded of the need for us to study hard and to pass the test."
(14) Compression/ Ellipsis	"She fell and in so doing broke her leg."

To help teach these structures, we developed a book entitled Reading Difficult Sentences. However, some of my colleagues at

the Institute felt that some of the examples used in the book are contrived. They suggested that we find real examples of each of the complex structures listed above. In order to do this but also in order to construct a factual database, however small, of the nature of the English of economics, we initiated the present project. Below we first outline our methodology, next present our findings, and finally make some suggestions for classroom teaching based on these findings.

Methodology

First, five textbooks representative of those typically used in introductory economics courses were selected and ten sample excerpts (each ranging from approximately 250 to 600 words in length) from each textbook were analyzed for the presence of the fourteen grammatical structures cited above. Two of the textbooks were published in the 1980's and are currently used at the Economics Institute (Gwartney and Mansfield), two -- the shortest ones -- were published in the 1970's and were used by this author as a student in his first introductory economics course (Dooley and Gill), and the final one (McConnell), published in 1969, was the standard introductory economics textbook used throughout the country in the early 1970's. The length of each excerpt was proportional to the length of the book. (Thus, excerpts from Dooley and Gill tended to be shorter while those from the other three textbooks tended to be longer.) The first sample from each textbook was taken from material about one tenth

of the way through the book, the second sample from material about two tenths of the way through the book, and so on. (Thus, in a textbook 600 pages long, the first sample would be taken from material around page 60, the second from material around page 120, etc.) Care was taken to exclude material having too many mathematical formulas from these samples.

At this point we began counting and recording the incidence of the syntactical structures mentioned above. We soon realized, however, that some of them were too difficult to count objectively. These were examples of Fronting, Clefting and Pseudoclefting, examples of Parallelism and Compression/Ellipsis, and some examples of Complex Adjective Phrases. The examples of Fronting presented a problem of interpretation. Are sentences beginning with prepositional phrases, for example, considered to be examples of Fronting? In the case of Clefting, we could find only five or six examples throughout our fifty different samples -- not enough to make statistically significant conclusions as to the frequency of its occurrence. And in the total corpus we could find not one example of Pseudoclefting! Just the opposite occurred with Parallelism and Compression/Ellipsis. Almost every sentence had two or three examples of each, some of them so different that again statistically significant conclusions would be impossible. Finally, in the case of Complex Adjective Phrases, we could count only the hyphenated adjectives. Examples of multiple nouns modifying a noun head were many: at the beginning we decided to count examples with two or more nouns modifying a noun head, but there were so many of them that in the middle of our analysis we changed to counting only examples with

at least three "noun modifiers," thus invalidating any statistical significance we might have had up to that point. Also at times there was a problem of interpretation -- were some words really nouns or not? And with appositive-like adjectives there was again a problem of interpretation: we were finding too many examples that were questionable.

In the final analysis, then, because of the problems outlined above, we did not count (for purposes of statistical comparison) any of the examples of Fronting, Clefting, Pseudoclefting, Parallelism, Compression/Ellipsis, "Noun-Modifier" Adjectives, or Appositive-Like Complex Adjectives. Instead, we just made note of some of the better examples of these complex syntactical structures for later possible use in developing our teaching curriculum.

Before we begin to look at our findings, several final observations regarding methodology are in order. The first one regards our method of counting. We found it easiest to read through each sample looking for examples of no more than four different grammatical structures at a time, this in order not to miss anything. In spite of our caution, we still found later on that we had missed counting some examples of different structures. Nevertheless, we can assure the reader that there was no more than a three percent error rate in our counting, probably less. The second methodological observation regards the possibility of using computers to undertake such a project. We again assure the reader that we considered this alternative, but rejected it because it would have limited us to only a few of the

desired structures, namely, (1) words ending in -ing (which would have had to be sorted according to structure), (2) words ending in -ed (again requiring sorting according to structure), (3) structures using the word that (with more sorting necessary), (4) structures including all wh words (again necessitating sorting), and (5) conjunctions such as and, or, and but indicating parallelism. Even with all the sorting required above, such a computer procedure would still have missed irregular past participles and that-clauses where the that is omitted. Thus, the computer alternative was rejected!

Results

In the following tables we present the results of our investigation, beginning with the syntactical structure having the highest frequency of occurrence (i.e., participials) and proceeding on down to that occurring least frequently in our samples (wh-noun clauses). In each table we show the frequency of occurrence per 100 words of text in each of the ten different samples for each of the five different textbooks selected. For each textbook we also give the range of frequencies in the samples and the mean of all samples. Data is also given regarding the statistical significance of the differences in frequencies between textbooks. Finally, in the case of participials, infinitives, and gerunds, we break down frequency of occurrence into different types. In all cases we cite examples of the different grammatical structures. The last table looks at differences in frequency of occurrence of

eight different syntactical structures across the five different textbooks and is followed by information regarding statistically significant differences in these frequencies.

We begin, then, with Table No. 1, Participials.

TABLE No. 1

PARTICIPIALS

Number of Participials per 100 words

Text ---	McConnell	Gwartney	Mansfield	Gill	Dooley
Sample No. 1 ---	2.11	1.15	2.41	1.63	0.42
No. 2 ---	1.10	1.35	0.88	1.35	1.20
No. 3 ---	2.73	3.08	1.32	1.07	0.81
No. 4 ---	1.08	2.90	2.69	1.66	1.58
No. 5 ---	2.99	1.83	1.69	1.88	0.77
No. 6 ---	1.47	3.12	1.57	1.08	2.72
No. 7 ---	2.80	1.61	0.22	1.38	2.86
No. 8 ---	2.93	1.59	3.43	2.47	2.85
No. 9 ---	3.90	0.88	1.75	2.56	1.21
No.10 ---	6.03	1.59	2.83	1.38	0.41
Range	1.08 - 6.03	0.88 - 3.12	0.22 - 3.43	1.07 - 2.56	0.41 - 2.86
Mean	2.714	1.910	1.879	1.646	1.483

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	89,805.72	4	22,451.43	2.23
Within groups	453,993.88	45	10,088.752	

Note: $F = 2.23 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

We note here that although there is a difference in means of 1.231 [2.714 - 1.483] between the frequency of occurrence of participials in McConnell and that in Dooley, our one-way ANOVA suggests that this difference is not significant at the .05 level.

In Table No. 2 below we further break down the different kinds

of participials in our samples and list some examples for each type.

TABLE No. 2

TYPES OF PARTICIPIALS

Number of Participials per 100 words

Text -- Gwartney Type	Gill	Dooley	Mansfield	McConnell	TOTAL
Adjective	30(35.3%)	32(53.3)	20(54.1)	34(39.5%)	67(52.8%)	183(46.3%)
COMPD Adj.	5(5.9%)	3(5.0%)	1(2.7%)	1(1.2%)	7(5.5%)	17(4.3%)
Compl.Adj.	5(5.9%)	4(6.7)	2(5.4%)	3(3.5%)	5(3.9%)	19(4.8%)
Compl.COMPD adjective	1(1.2%)	2(3.3%)	0	0	1(0.8%)	4(1.0%)
Adj. from GERUND	0	0	0	0	1(0.8%)	1(0.3%)
OTHER	44(51.7%)	19(31.7)	14(37.8)	48(55.8%)	46(36.2%)	171(43.3%)
TOTALS	85(100%)	60(100%)	37(100%)	86(100%)	127(100%)	395(100%)
PAST -ED	42(49.4%)	38(63.3)	22(59.5)	53(61.6%)	72(56.7)	227(57.5%)
PRESENT -ING	43(50.6%)	22(36.7)	15(40.5)	33(38.4%)	55(43.3)	168(42.5%)

Examples: (1) "...net investment also has a capacity-creaing aspect;..." (COMPD Adj.) --McConnell, p. 357.

(2) "...the total utility which a consumer derives from his given [Adjective] income is at a maximum when the marginal utility derived [OTHER] from the last dollar..." -- Dooley, p. 25.

(3) "...the inflation and sluggish growth of the 1970's are not particularly surprising." (Compl. Adj.) -- Gwartney, p. 164.

In Table No. 3 we look at the frequency of occurrence of Infinitives.

TABLE No. 3

INFINITIVES

Number of Infinitives per 100 words

Text ---	Gwartney	Mansfield	McConnell	Gill	Dooley
Sample No. 1 ---	1.83	2.41	2.75	1.09	0.00
No. 2 ---	1.58	1.10	0.66	1.08	0.42
No. 3 ---	1.76	1.76	0.21	0.80	0.00
No. 4 ---	0.45	2.24	1.72	2.76	1.25
No. 5 ---	0.23	0.64	1.49	0.80	1.15
No. 6 ---	2.90	2.02	1.89	1.08	2.08
No. 7 ---	2.53	0.89	1.72	1.10	0.83
No. 8 ---	0.91	2.36	1.67	1.92	0.81
No. 9 ---	1.10	1.53	1.08	0.80	3.24
No. 10---	3.85	0.65	1.04	1.10	0.82
Range	0.23 - 3.85	0.64 - 2.41	0.21 - 2.75	0.80 - 2.76	0.00 - 3.24
Mean	1.714	1.560	1.423	1.253	1.060

Summary of One-Way ANOVA

Sourse of variation	SS	df	MS	F
Between groups	26,191.4	4	6547.85	0.90
Within groups	325,746.6	45	7238.81	

Note: $F = 0.90 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

We note here that again although there is a difference in means of 0.654 [1.714 - 1.060] between the frequency of occurrence of infinitives in Gwartney and that in Dooley, our one-way ANOVA suggests that this difference is not significant at the .05 level.

In Table No. 4 below we further break down the different kinds of infinitives in our samples and list some examples for each type, just as we did in the case of participials.

TABLE No. 4

TYPES OF INFINITIVES

Number of Infinitives per 100 words

Text -- Gwartney / Type	Gill	Dooley	Mansfield	McConnell	TOTAL
Compl.Subj. 3.7%	10.4%	9.4%	1.3%	3.9%	4.76%
Noun Modifier 19.8%	12.5%	6.2%	10.4%	10.4%	12.70%
Idiom* 14.8%	10.4%	12.5%	10.4%	16.9%	13.33%
Delayed Subject 11.1%	14.6%	3.1%	16.9%	7.8%	11.43%
"In Order To" 16.0%	20.8%	9.4%	29.9%	14.3%	19.05%
Following Verb 34.6%	29.2%	50.0%	25.9%	29.9%	32.06%
Subject	2.1%				0.32%
Adj.Modifier		9.4%	5.2%	14.3%	5.71%
Appositive				2.5%	0.64%

*Twenty-eight Idioms are double-counted.

Examples: (1) "A major purpose of economics is to ensure that..." (Compl.Subj.) -- Gwartney, p. 23.

(2) "...an output rate that is is big enough to satisfy the entire market..." (Idiom, Adj. Modifier) -- Mansfield, p. 307.

(3) "it is not surprising to find that..." (Delayed Subject) -- McConnell, p. 40.

(4) "The $20 billion increase...will cause saving to increase by $5 billion..." (Following Verb) --McConnell, p. 357.

(5) "Investment spending must expand to compensate for this increase." (In Order To) -- McConnell, p. 357.

(6) "To repeat our earlier definition:..." (Subject) -- Gill, p. 223.

(7) "...increase our ability to produce goods and services." (Noun Modifier) -- Gwartney, p. 23.

Table No. 5 lists frequency of occurrence of Passives in our different samples and gives a few examples. We can see that there is a difference in means of more than 1.00 [2.057-1.013=1.044] but again this difference proves to be insignificant at the .05 level. The Table gives a summary of the one-way ANOVA.

TABLE No. 5

PASSIVES

Number of Passives per 100 words

Text --	Dooley	Mansfield	McConnell	Gwartney	Gill
Sample No. 1 --	3.33	0.44	0.85	1.15	1.09
No. 2 --	1.59	1.32	1.32	1.58	1.08
No. 3 --	3.66	0.66	0.63	1.54	0.54
No. 4 --	1.19	2.24	1.08	0.45	1.66
No. 5 --	2.31	0.85	0.64	1.14	0.54
No. 6 --	1.95	0.67	1.05	0.89	1.34
No. 7 --	0.41	1.34	2.37	0.46	1.38
No. 8 --	1.22	4.28	1.46	0.91	1.10
No. 9 --	0.40	0.87	0.65	1.53	0.57
No.10 --	4.51	2.61	0.83	1.13	0.83
Range	0.40 - 4.51	0.66 - 4.28	0.63 - 2.37	0.46 - 1.58	0.54 - 1.66
Mean	2.057	1.528	1.088	1.078	1.013

Examples: (1) "...doctrines have been subjected to..."
-- Gill, p. 39.

(2) "...capacity will be increased,..."
-- Dooley, p. 76.

(3) "...choices can be garnered from..."
-- McConnell, p. 517.

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	78,769.08	4	19,692.27	2.48
Within groups	357,467.02	45	7,943.71	

Note: $F = 2.48 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

At this point we turn our attention to Relative Clauses. Table No. 6 below gives the frequency of occurrence of this syntactical structure in our different samples. And again we must reject the null hypothesis, for even though there is a difference of 0.812 [1.493 - 0.681] in the means, our one-way ANOVA still shows this not to be statistically significant.

TABLE No. 6

RELATIVE CLAUSES

Number of Relative Clauses per 100 words

Text --	Dooley	Gill	Gwartney	Mansfield	McConnell
Sample No. 1 --	2.08	1.36	0.23	0.44	1.06
No. 2 --	2.08	1.89	1.58	0.88	0.88
No. 3 --	2.92	1.07	0.88	0.88	0.42
No. 4 --	0.42	1.66	0.45	0.67	0.22
No. 5 --	2.08	1.34	0.00	0.42	0.85
No. 6 --	0.42	0.81	1.11	1.35	0.84
No. 7 --	1.67	0.28	1.15	0.67	0.86
No. 8 --	0.41	2.19	0.68	1.50	0.63
No. 9 --	1.21	0.85	1.76	1.09	0.22
No.10 --	1.64	0.83	1.36	0.87	0.83
Range	0.41 - 2.92	0.28 - 2.19	0.00 - 1.76	0.42 - 1.50	0.22 - 1.06
Mean	1.493	1.228	0.920	0.877	0.681

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	12,873.74	4	3218.44	0.83
With groups	174,315.26	45	3873.67	

Note: $F = 0.83 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

Again we list some Examples:

(1) "It also means that laborers are free to enter any of those lines of work for which they are mentally and physically qualified." -- McConnell, p. 40.

(2) "This creates income for the producer of shoes, who now buys himself an umbrella." -- Gill, p. 121.

Our next table, Table No. 7, looks at Gerunds. And here again, as was the case with Participials and Infinitives, we need to take a closer look and divide Gerunds into different types. This we do in Table No. 8 below.

As has been the case with every syntactical structure we have examined so far, there is no significant difference between

the largest mean number of Gerunds (found in McConnell) and the smallest (found in Mansfield). Again our one-way ANOVA bears this out.

TABLE No. 7

GERUNDS

Number of Gerunds per 100 words

Text --	McConnell	Gwartney	Gill	Dooley	Mansfield
Sample No. 1 --	1.06	0.45	0.55	0.00	0.22
No. 2 --	0.00	1.81	0.81	1.20	0.22
No. 3 --	2.31	1.76	0.27	0.00	1.32
No. 4 --	1.29	0.22	0.55	2.37	0.45
No. 5 --	2.35	0.00	1.34	0.77	0.00
No. 6 --	1.89	1.11	1.34	1.17	0.22
No. 7 --	4.52	0.46	0.28	0.00	0.45
No. 8 --	0.00	0.46	1.37	0.00	0.21
No. 9 --	0.87	1.53	0.00	0.40	0.22
No.10 --	0.42	0.68	1.10	0.82	0.87
Range	0.00 - 4.52	0.00 - 1.81	0.00 - 1.37	0.00 - 2.37	0.00 - 1.32
Mean	1.471	0.848	0.761	0.673	0.418

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	17,322.24	4	4330.56	0.57
Within groups	342,221.94	45	7604.93	

Note: $F = 0.57 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

As we stated above, we now divide Gerunds into different types -- in Table No. 8 below. However, first we will take a look at some examples of Gerunds occurring in our samples.

Examples: (1) "...the making of profits generally requires time..." (Subject) -- Mansfield,, p. 142.

(2) "...a family has a high probability of staying poor." (Object of Preposition) -- McConnell, p. 676.

(3) "Cost calculations give financial meaning to the laws of production..." (Object) -- Dooley, p. 59.

(4) "Its worth as a commodity may come to exceed its worth as money, causing it to cease functioning as...." (Object following Verb) -- McConnell, p. 279.

(5) "One of the most distressing features of the fifties was the slowing down of the growth rate..." (Subject Compl) -- McConnell, p. 199.

TABLE No. 8

TYPES OF GERUNDS

Number of Gerunds per 100 words

Text -- Type	Gwartney	Gill	Dooley	Mansfield	McConnell	TOTAL
Object of Prep.	23(60.5%)	24(82.8)	12(70.6)	14(73.7%)	38(69.1%)	111(70.3%)
Subject	7(18.4%)	4(13.8)	2(11.8)	5(26.3%)	9(16.4%)	27(17.1%)
Object	8(21.1%)	0	2(11.8)	0	6(10.9%)	16(10.1%)
Obj. fol. Verb	0	1(3.4%)	0	0	1(1.8%)	2(1.25%)
Subject Compl.	0	0	1(5.8%)	0	1(1.8%)	2(1.25%)
TOTAL	38(100%)	29(100%)	17(100%)	19(100%)	55(100%)	158(100%)

Table No. 9 lists frequency of occurrence of That-Clauses in our different samples and gives a few examples. For the first time our one-way ANOVA (and subsequent use of the Tukey Method) suggests that there is a significant difference between the highest and lowest means, i.e., between 0.961 That-clauses per 100 words in Mansfield and 0.291 That-clauses per 100 words in Dooley. On careful comparison of the two textbooks, one can see how this might be possible: Dooley definitely has much shorter sentences (and thus fewer complex ones -- for example, sentences including That-clauses --) than does Mansfield. But let us turn

to the data itself.

TABLE No. 9

THAT-CLAUSES

Number of That-clauses per 100 words

Text --	Mansfield	Gill	McConnell	Gwartney	Dooley
Sample No. 1 --	0.44	0.82	1.06	0.46	0.42
No. 2 --	1.32	1.08	0.22	0.45	0.83
No. 3 --	1.76	0.80	1.26	0.22	0.83
No. 4 --	0.22	0.83	0.43	1.56	0.00
No. 5 --	0.85	0.54	1.28	0.00	0.42
No. 6 --	0.67	0.54	0.21	0.67	0.00
No. 7 --	0.89	0.00	0.86	0.92	0.00
No. 8 --	1.28	0.55	0.21	0.68	0.41
No. 9 --	1.53	0.57	1.30	0.66	0.00
No.10 --	0.65	1.66	0.42	0.68	0.00
Range	0.22 - 1.76	0.00 - 1.66	0.21 - 1.30	0.00 - 1.56	0.00 - 0.83
Mean	0.961	0.739	0.726	0.630	0.291

Examples: (1) "Suppose that the circle is cut and is stretched..." -- Dooley, p. 8.

(2) "The net result, it is contended, is a misallocation of resources;..." -- McConnell, p. 517.

(3) "One reason why the price-consumption curve is of interest is that it can be used to derive the consumer's individual demand curve for..." -- Mansfield, p. 86.

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	23,781.72	4	5945.43	3.14
Within groups	85,301.10	45	1895.58	

Note: $F = 3.14 > .95\ F_{4,45} = 2.59$
$> .975\ F_{4,45} = 3.10$
Thus, we reject Ho, $p < .025$.

Our next table, Table No. 10, shows the frequency of occurrence of Appositives in our samples. And again back we

go to the lack of a significant difference in means. (As previously, we list a few examples.)

TABLE No. 10

APPOSITIVES

Number of Appositives per 100 words

Text --	Gill	Mansfield	Gwartney	McConnell	Dooley
Sample No. 1 --	1.09	0.44	1.61	0.42	0.00
No. 2 --	0.27	0.22	0.45	0.00	0.00
No. 3 --	0.54	0.22	1.32	0.84	0.42
No. 4 --	0.83	0.22	0.00	0.43	0.42
No. 5 --	1.34	0.85	0.69	1.28	1.67
No. 6 --	0.54	0.00	0.45	0.00	1.25
No. 7 --	0.55	1.34	0.23	1.08	0.00
No. 8 --	0.82	0.43	0.23	0.42	0.00
No. 9 --	1.14	0.00	0.44	0.43	0.00
No.10 --	0.55	1.96	0.23	0.62	0.41
Range	0.27 - 1.34	0.00 - 1.96	0.00 - 1.61	0.00 - 1.28	0.00 - 1.67
Mean	0.767	0.568	0.565	0.552	0.417

Examples: (1) "The theory of input pricing was therefore a theory of the distribution of income among landowners, wage earners, and capitalists, three important economic and social classes." -- Mansfield, p. 361.
(2) "Something of a cross between economics and political science, public choice theory applies the principles and methodology of economics to..." -- Gwartney, p. 70.

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	6249.88	4	1562.47	0.60
Within groups	117,593.9	45	2613.20	

Note: $F = 0.60 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

This brings us to our last syntactical structure on which we have frequency data -- Wh-Noun Clauses. In Table No. 11 below we

list these frequency data (as we have for all preceding syntactical structures counted). After giving three examples of Wh-Noun Clauses, we once more summarize results on our one-way ANOVA. And one final time, we again see no statistically significant difference in means.

TABLE No. 11

WH-NOUN CLAUSES

Number of Wh-Noun Clauses per 100 words

Text --	Dooley	Gill	Mansfield	Gwartney	McConnell
Sample No. 1 --	0.83	1.36	0.00	0.00	0.63
No. 2 --	0.00	0.81	0.22	0.90	0.00
No. 3 --	0.42	0.54	0.66	0.00	0.00
No. 4 --	2.92	0.28	0.22	0.22	0.00
No. 5 --	0.00	0.00	0.00	0.00	0.00
No. 6 --	0.00	1.08	0.22	0.00	0.42
No. 7 --	0.00	0.00	0.67	0.00	0.00
No. 8 --	0.00	0.00	0.21	0.00	0.00
No. 9 --	0.00	0.00	0.00	0.44	0.00
No.10 --	0.82	0.83	0.44	0.68	0.21
Range	0.00 - 2.92	0.00 - 1.36	0.00 - 0.67	0.00 - 0.90	0.00 - 0.63
Mean	0.499	0.490	0.264	0.224	0.126

Examples:

(1) "The production-possibilities curve does not tell us where the society will be..." -- Gill, p. 13.

(2) "Our purpose has been to analyze how we would expect the public sector..." -- Gwartney, p. 450.

(3) "Of course, where one draws the line... is an arbitrary matter." -- McConnell, p. 756.

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	11,092.72	4	2773.18	1.04
Within groups	119,458.1	45	2654.62	

Note: $F = 1.04 < .95\ F_{4,45} = 2.59$
Thus, we cannot reject Ho, $p < .05$.

This finalizes our look at the relationship between frequencies of occurrence of the various syntactical structures and the five different textbooks. We now look at the relationships between frequencies of occurrence of the different structures themselves across the five different textbooks. That is, we want to find out if there is a significant difference between frequencies of occurrence of the different syntactical structures regardless of which textbook we use. The results appear in Table No. 12 below.

TABLE No. 12

Syntactical Structures
Frequency of Occurrence Across Ten Samples (per 10,000 words)

Structure--Part. / Text	Inf.	Pass.	Rel.Cl.	Ger.	That-Cl.	Appos.	Wh-N.Cl.
McConnell	2714	1423	1088	681	1471	726	552	126
Gwartney	1910	1714	1078	920	848	630	565	224
Gill	1646	1253	1013	1228	761	739	767	490
Dooley	1483	1060	2057	1493	673	291	417	499
Mansfield	1879	1560	1528	877	418	961	568	264

Note: Part. = Participials; Inf. = Infinitives; Pass. = Passives; Rel.Cl. = Relative Clauses; Ger. = Gerunds; That-Cl. = That Clauses; Appos. = Appositives; and Wh-N.Cl. = Wh-Noun Clauses.

Summary of One-Way ANOVA

Source of variation	SS	df	MS	F
Between groups	9,620,596.5	7	1,374,370.9	13.013
Within groups	3,379,583	32	105,611.96	

Note: $F = 13.013 > .999\ F_{7,32} = 4.74$
Thus, we must reject Ho, $p < .001$.

Next, using the Tukey Method we determine that the following

syntactical structures show significantly different frequencies of occurrence between each other:

Participials	with	Relative Clauses, Gerunds, That-Clauses, Appositives, and Wh-Noun Clauses.*
Infinitives	with	Appositives and Wh-Noun Clauses.*
Passives	with	Wh-Noun Clauses.*
Infinitives	with	That-Clauses.@
Passives	with	That-Clauses and Appositives.@
Relative Clauses	with	Wh-Noun Clauses.@

Note: * = reject Ho, $p < .001$; @ = reject Ho, $p < .005$.

All other pairwise comparisons show no statistically significant differences.

This, then, brings us to the end of our examination of complex grammatical structures in our samples from five different introductory economics textbooks. As mentioned at the outset, we did not count examples of Complex Adjectives (except in the case of hyphenated adjectives); Fronting, Clefting, or Pseudoclefting; Parallelism; or Compression/Ellipsis. Instead, we have included information on these structures in Appendices A, B, C, and D respectively. What remains to be done is to make some concluding remarks, including suggestions as to the possible applicability of the above to classroom teaching.

Conclusions

One cannot conclude, based on such a small sample, that the occurrence of these specific grammatical structures in economics textbooks can be generalized to all economics textbooks, to all

"economics discourse" or, greater still, to other disciplines. Thus, we point out the need for two further types of studies. One would basically replicate what we have done here, looking at other economics textbooks and/or other types of discourse in economics. The other would be a comparable study, investigating whether similar syntactical structures occur in other types of discourse and whether their frequencies of occurrence differ significantly from those of the grammatical structures we have looked at here in our sample of economics discourse. At present, we are contemplating two such studies, one looking at introductory finance textbooks and the other examining the frequency of occurrence of the above-mentioned structures in statistics textbooks used in economics and business programs.

This, then, leaves our comments regarding the possible applicability of such research to classroom teaching. And if we took the eight syntactical structures that we worked with in this study in order of their frequency of occurrence, from most frequent to least frequent -- i.e., Participials, Infinitives, Passives, Relative Clauses, Gerunds, That-Clauses, Appositives and finally Wh-Noun Clauses --, it might suggest that in teaching ESOL for economics we should stress first those structures occurring more frequently -- i.e., Participials, Infinitives, Passives, Relative Clauses and Gerunds -- and wait until later to stress those occurring less often -- namely, That-Clauses, Appositives and Wh-Noun Clauses. Such a frequency-based decision would suggest, then, that we not teach Pseudoclefting at all and that we give very little if any attention to Clefting.

Parallelism and Compression/Ellipsis would, using the same logic, receive a great deal of attention.

But perhaps rather than basing such decisions on relative frequency of occurrence, we ought instead to base them on relative difficulty that students have with such structures. That is, relatively more teaching time ought to be devoted to those structures which students have relatively more trouble understanding. And this suggests another related area for further research -- design an experiment in which students would read excerpts from economics textbooks (or other economics discourse) and see which syntactical structures would present them with the greatest difficulty. The author's intuition, however, suggests that perhaps the best course of action would be a compromise between these two courses of action. That is, up to a certain point the guiding principle regarding what to stress first in teaching students would be the relative degree of difficulty of a given structure. However, if such a structure, no matter how difficult, occurred very infrequently, it would not be wise to spend much time teaching it. A case in point in this regard is Pseudoclefting.

However, before any such decisions can even begin to be made, the research itself has to be done. And it is in this area -- further research similar to what has been suggested above -- that we invite our readers to now concentrate their efforts.

REFERENCES

Biber, Douglas. "Spoken and Written Textual Dimensions in English: Resolving the Contradictory Findings," in Language, Vol. 62, No. 2 (1986), pp. 384-414.

Dooley, Peter C. Elementary Price Theory (2nd ed.). Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1973, 176 pp. (162 pp. of text)

Gill, Richard T. Economics and the Public Interest (3rd ed.). Pacific Palisades, California: Goodyear Publishing Co., 1976, 272 pp. (264 pp. of text)

Gregory, John and Larson, Doug. "An Analysis of Introductory Economics Texts Using Writer's Workbench," an unpublished paper written for the E590 class at Colorado State University. Fort Collins, Colorado, Fall 1982.

Gwartney, James D., Stroup, Richard and Clark, J.R. Essentials of Economics (2nd ed.). New York: Harcourt, Brace Jovanovich, 1985, 480 pp.

Mansfield, Edwin. Microeconomics: Theory and Applications (4th ed.). New York: W.W. Norton and Co., 1982, 583 pp. (555 pp. of text)

McCaffrey, Margaret and Smith, Vicki L. "Rhetorical Acts in Introductory Economics Texts," an unpublished paper written for the E590 class at Colorado State University. Fort Collins, Colorado, Fall 1982.

McConnell, Campbell R. McConnell Economics (4th ed.). New York: McGraw-Hill Book Co., 1969, 815 pp. (795 pp. of text)

Rosenzweig, Mark R. "Population Growth and Human Capital Investments: Theory and Evidence," revised version of a paper presented at the conference "The Problem of Development: Exploring Economic Development Through Free Enterprise," Institute for the Study of Free Enterprise Systsems, Buffalo, New York, May 27-29, 1988. (July 1988)

APPENDIX A

COMPLEX ADJECTIVES

Number of Hyphenated Adjectives per 100 words

Text --	Mansfield	McConnell	Gill	Gwartney	Dooley
	1.02	0.49	0.45	0.23	0.20

Examples:
(1) "the least-cost point" -- Dooley, p. 77.
(2) "low-cost information" -- Gwartney, p. 450.
(3) "the output-creating effects" -- Gill, p. 223.
(4) "a balance-the-budget principle" -- Gill, p. 145.

Appositive-Like Adjectives

Examples:
(1) "Much more significant than coins, paper money constitutes about one-fifth of the economy's money supply." -- McConnell, p. 279.
(2) "We must recognize at the outset that, while multidimensional, poverty is a legitimate economic problem." -- McConnell, p. 676.
-- McConnell, p. 676.
(3) "...every possible constraint imaginable..." -- Gill, p. 145.
(4) "... other means of production, natural or man-made...." -- Gill, p. 223.

Multiple Nouns Used as Adjectives

Examples:
(1) "complex government reorganization plan" -- Gwartney, p. 450.
(2) "relative price incentive effects" -- Gwartney, p. 165.
(3) "the profit maximization assumption" -- Mansfield, p. 142.
(4) "a particular good's market supply curve" -- Mansfield, p. 30.

APPENDIX B

FRONTING

Examples:

(1) "This you can verify by looking at Figure 8-1 again." -- Gill, p. 121.

(2) "Wages are a cost to the firm but to the worker they are an important determinant of income..." -- Mansfield, p. 361.

(3) "Closely related to private ownership of property is freedom of enterprise and choice." -- McConnell, p. 40.

(4) "And so it goes for succeeding years." -- McConnell, p. 357.

(5) "The net result, it is contended, is a misallocation of resources;..." -- McConnell, p. 517.

(6) "In the product market business enterprises supply the output that consumers demand..." -- Dooley, p. 8.

(7) "In terms of least-cost input combinations, the long-run average cost function can be interpreted in the following way: ...." -- Mansfield, p. 196.

CLEFTING

Examples:

(1) "Indeed, it will be precisely when savings in total have increased by the same amount as business investment that the process finally ends." -- Gill, p. 121.

(2) "Why is it that land of one kind yields a higher financial return than land of another kind? -- Mansfield, p. 361.

(3) "It is the diminishing marginal productivity of the resource which causes marginal costs to increase as output is increased." -- McConnell, p. 596.

(4) "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own self-interest." -- Gwartney, p. 303.

APPENDIX C

PARALLELISM

Examples: (1) "In both markets, supply and demand determine prices, which in turn serve as indices of scarcity to buyers and sellers and help allocate the resources of the economy."
-- Dooley, p. 8

(2) "The rise in the demand for mechanics tended to increase the wage of mechanics while the fall in demand for wheelwrights tended to decrease the wage of wheelwrights."
(Parallelism of style) -- Dooley, p. 146.

(3) "What these curves tell us is that in 1970 we were able to produce both more food and more steel than in 1960 and that, by 1980, we had hypothetically advanced still further."
-- Gill, p. 13.

(4) "Through a continuing process that involves population growth, the accumulation of machines and other capital goods, and above all, a constant attention to invention and innovation -- new products, new discoveries, new technologies of production -- these modern economies are shifting out their production possibilities at a rate unknown in the early history of mankind."
-- Gill, pp. 13-14.

(5) "There are similar swings in employment, money and credit, investment and output, and stock market and commodity price data."
-- Gill, p. 121.

(6) "...these effects will be solely due to the monetary changes, not to the direct effects of government spending and taxation policy."
-- Gill, p. 171.

(7) "Some of the arguments on the other side of the picture allegedly 'debunk' the claims for advertising; others raise new points."
-- McConnell, p. 517.

(8) "The...Acts, which are aimed at protecting consumers from product misrepresentation and misleading advertising, testify to past abuses..." (Based on meaning, not on grammatical form)
-- McConnell, p. 517.

(9) "They have been spendthrifts in the days of youth and high earning power and now, in their old age, are unable to supplement their social security benefits or relief payments."
-- McConnell, p. 676.

(10) "...we seek to explain various economic actions of decision-makers and, in general, how the market operates."
(Poor style) -- Gwartney, p. 70.

(11) "This means developing a logically consistent theory linking individual behavior to collective action, analyzing the implications of that theory, and testing these implications against the events of the real world."
-- Gwartney, p. 70.

(12) "...competition harnesses the profit motive and puts it to work, elevating our standard of living and directing

our resources toward the production of those goods that..."
-- Gwartney, p. 308.

(13) "Others charge that past regulatory policies have often reduced market competitiveness, contributed to economic inefficiency and, in general ignored major concerns of consumers and workers." -- Gwartney, p. 355.

Note: Underlined words or phrases either connect parallel items [for example, number 10 above] or indicate items which are connected in parallelism by such connectors [for example, number 13 above].

APPENDIX D

ELLIPSIS/COMPRESSION

Examples: (1) "In both markets, supply and demand determine prices, which in turn serve as indices of scarcity to buyers and sellers and * help allocate the resources of the economy."
-- Dooley, p. 8.

(2) "What makes one item a credit item and * another * a debit * in international trade accounting?" -- Gill, p. 197.

(3) "... it will bring more laborers into the economy and hence * a greater productive capacity." -- Gill, p. 223.

(4) "And so it goes for succeeding years."
-- McConnell, p. 357.

(5) "... Px1 and Wa1 are the equilibrium product price and wage rate for industry X, and Py1 and Wb1 represent the equilibrium * price and wage * for industry Y." -- McConnell, p. 596.

(6) "We must recognize at the outset that, while * multidimensional, poverty is a legitimate economic problem."
-- McConnell, p. 676.

(7) "... consumers will respond by purchasing more of the cheaper product...because they can now better afford to do so."
-- Gwartney, p. 260.

(8) "Most contemporary economists believe, just as Adam Smith did, that..." -- Gwartney, p. 355.

(9) "The latter idea is too complex and the outcome * too difficult for voters to identify." -- Gwartney, p. 450.

Note: Underlined items indicate substitute, compressed forms for information that has previously appeared in a longer form. Asterisks (*) indicate that some information has been left out -- that is, is compressed or understood.